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EXAMINER	
KIM, CHONG R	
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SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/22/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)
	09/766,238	LAINEMA ET AL.
	Examiner	Art Unit
	Charles Kim	2624

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 November 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *40-116* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *40-116* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 August 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed on November 29, 2006 has been entered and made of record.

2. Applicant's arguments, see pages 2-5, filed November 29, 2006, with respect to the written description requirement under 35 USC 112 first paragraph for claims 40-116 have been fully considered and are persuasive. The 35 USC 112 first paragraph rejections of claims 40-116 from the Office Action dated May 29, 2006 have been withdrawn.

3. Applicant's arguments, see page 25, filed May 5, 2006, with respect to the 35 USC 112 second paragraph rejections for claims 40-117 have been fully considered and are persuasive. The 35 USC 112 second paragraph rejections of claims 40-117 from the Office Action dated November 1, 2005 have also been withdrawn.

4. Applicant's arguments, see pages 26-31, filed May 5, 2006, with respect to the 35 USC 103(a) rejections for claims 40-117 have been fully considered, but they are not deemed to be persuasive for at least the following reasons.

Applicants argue (page 26 of arguments dated May 5, 2006), that "the combination of Andrew and Nishi fails to disclose or suggest the pixel value of at least one reconstructed pixel in at least one of said current decoded image block and said previously decoded image block is modified by filtering to produce a modified pixel value, wherein said modified pixel value is made available for use in INTRA prediction of an image block within the same image as said current decoded image block and said previously decoded image block, as recited by claims 40, 58, 76, and 94."

More specifically, applicants contend that Nishi fails to disclose the feature lacking in Andrew, i.e., INTRA prediction of pixel values. According to applicants, "there is nothing in Nishi that disclose or suggests filtering block boundaries...there is nothing in Nishi that discloses a previously decoded image block that is modified by filtering to produce a modified pixel value...there is nothing that even suggests that the modified pixel value is made available for use in the INTRA prediction of an image block within the same image." The examiner disagrees.

The examiner would like to point out that the Nishi reference was not relied upon to teach the step of filtering block boundaries or modifying pixels by filtering to produce a modified pixel value. As explained on page 4 of the Office Action dated November 1, 2005, Andrew teaches these features. Instead, Nishi was relied upon to teach the step of INTRA prediction of an image block within the same image as a current decoded image block and a previously decoded image block.

Nishi discloses an image block decoding process that receives coded data and generates restored data blocks based on INTRA prediction (Nishi, col. 24, lines 40-63 and figure 2). More specifically, Nishi discloses INTRA prediction of an image block within the same image as a current decoded image block and a previously decoded image block. The details of this process are described below.

The decoding process starts with an input data stream 110b that is fed to the variable-length decoder (VLD), wherein the VLD decodes the bit stream to restore coefficient difference values 108 [col. 24, lines 50-55]. An intra-frame prediction unit 210 generates intra-frame prediction values 111 of the block to be decoded based on a previously decoded image block stored in block memory 115 [col. 24, lines 58-60]. Subsequently, an adder 112 adds the intra-

frame prediction values 111 and the coefficient difference values 108 to restore the quantized coefficients of the block to be decoded [col. 24, lines 60-63].

As pointed out by the applicants (page 2 of arguments dated November 29, 2006), there are three types of blocks being processed in their invention: an image block within the same image, a current decoded image block, and a previously decoded image block. In Nishi (figure 2), the current decoded block is 116; a previously decoded image block is 114--the block stored in 115 immediately before 116 is stored; and the INTRA-predicted image block within the same image is the block that is obtained by adding 108 and the intra-frame prediction values 111 that are generated by 210 after the current decoded block is stored in 115 and fed to 113. Therefore, Nishi discloses the step of INTRA prediction of an image block within the same image as a current decoded image block and a previously decoded image block, as claimed by applicants.

Next, applicants argue (page 27 of arguments dated May 5, 2006) that "there is nothing [in Nishi] that even suggests that the modified pixel value is made available for use in INTRA prediction of an image block within the same image as said current decoded image block and said previously decoded image block." The examiner disagrees. As explained above, Nishi discloses an image block decompression process based on INTRA-prediction. <u>In order to implement this process in Andrew's method, the decompressing step (300 in figure 3) in Andrew would be modified to include the INTRA-prediction decompression technique of Nishi</u>.

Andrew discloses decompressing and block filtering steps that are performed on a block-by-block basis in raster scan order (figure 3). Initially, in step 204, a block is found in a compressed image. This block is then decompressed in step 300 and subsequently filtered in step 302 to reduce visual artifacts due to a boundary between a current decoded image block and

a previously decoded image block (col. 5, lines 45-47). Applying the block filtering step 302 to a current decoded image block and a previously decoded image block produces modified pixel values (col. 5, lines 12-33). <u>These modified pixel values are made available for the next block to be decompressed (step 300) as a result of the loop back to step 204 from step 208 (figure 3) and the implementation of Nishi's INTRA-prediction technique in Andrew's decompressing step 300.</u>

As explained above, Nishi decompresses image blocks based on an INTRA-prediction technique that uses a previously decoded image block. <u>Hence, by implementing Nishi's INTRA-prediction technique in Andrew's decompressing step 300, the modified pixel values obtained by the block filtering step 302 are made available for use in INTRA prediction of the subsequent block to be decompressed.</u> Therefore, the combination of Andrew and Nishi disclose that the pixel value of at least one reconstructed pixel in at least one of the current decoded image block and the previously decoded image block is modified by filtering to produce a modified pixel value, wherein the modified pixel value is made available for use in INTRA prediction of an image block within the same image as the current decoded image block and the previously decoded image block, as recited by claims 40, 58, 76, and 94.

Finally, applicants argue (page 27 of arguments dated May 5, 2006) that, "there is no suggestion or motivation to combine Andrew and Nishi." According to applicants, "Andrew is directed to eliminating blocking artifacts at high compression ratios. This is in contrast to Nishi which is directed to coding with high efficiency while reducing spatially redundant information. Thus, the nature of the problems solved by the references is notably different and does not suggest such a combination." The examiner disagrees. Andrew and Nishi are both concerned

with image compression methods. Additionally, both Andrew and Nishi are concerned with compressing and decompressing images on a block-by-block basis. Andrew's boundary filtering process includes a decoding step 300 (Andrew, figure 3). Nishi explains that the INTRA-prediction technique enhances the efficiency of the coding/decoding process (Nishi, col. 3, lines 24-33). Therefore, it would have been obvious to modify Andrew's decompressing step 300 to include the INTRA-prediction technique of Nishi. The suggestion/motivation for doing so would have been to improve the coding efficiency of Andrew's boundary filtering process.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 40, 45-49, 51, 53, 55, 58, 61-64, 66, 76, 79-82, 91, 94-96, 111-113 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Andrew, U.S. Patent No. 6,563,958 ("Andrew") and Nishi, U.S. Patent No. 6,275,533 ("Nishi").

Referring to claim 40, Andrew discloses a method for reducing visual artifacts in a digital image comprising a plurality of image blocks in which image blocks are encoded to form encoded image blocks and the encoded image blocks are subsequently decoded to form decoded image blocks, each decoded image block comprising a number of reconstructed pixels (col. 3, line 37-col. 4, line 4), each reconstructed pixel having an associated pixel value and filtering is

performed to reduce visual artifacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded image block such that the pixel value of at least one reconstructed pixel in at least one of the current decoded image block and the previously decoded image block is modified by filtering to produce a modified pixel value, wherein the modified pixel value is made available for use in further processing of an image block within the same image (col. 4, line 5-col. 5, line 65).

Andrew does not explicitly disclose that the further processing comprises INTRA prediction of an image block within the same image as the current decoded image block and the previously decoded image block. However, this feature was exceedingly well known in the art. For example, Nishi discloses INTRA prediction of an image block that is performed after a current block within the same image is decoded [col. 24, line 50-col. 25, line 6, and figure 2. Note that the "current block" is decoded in (203) and the intra prediction is performed subsequently in (210)]. Note that the combination of Andrew and Nishi would result in the pixel values being corrected by the filtering method of Andrew, and the corrected pixel values subsequently being used in the intra prediction method of Nishi.

Andrew and Nishi are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Andrew in view of Nishi. The suggestion/motivation for doing so would have been to reduce spatially redundant information in the image, thereby improving the coding efficiency (Nishi, col. 3, line 66-col. 4, line 2). Therefore, it would have been obvious to combine Andrew with Nishi to obtain the invention as specified in claim 40.

Referring to claim 45, Andrew further discloses that the modification of the value of at least one reconstructed pixel in at least one of the current decoded image block and the previous decoded image block by filtering is performed immediately after the current decoded image block is formed and a boundary exists between the current decoded image block and the previously decoded image block (col. 5, lines 1-63 and figure 3).

Referring to claim 46, Andrew further discloses that the filtering to reduce visual artefacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded image block is performed before all blocks of the digital image are decoded (col. 5, lines 1-63 and figure 3).

Referring to claim 47, Andrew further discloses that the filtering is performed to reduce visual artefacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded image block (col. 5, lines 1-63 and figure 3).

Referring to claim 48, Andrew further discloses that filtering to reduce visual artifacts due to the more than one boundary is performed sequentially on the more than one boundary in a certain boundary scanning order (col. 5, lines 1-63. Note that the two boundaries will be filtered in a certain order).

Referring to claim 49, Andrew discloses the step of filtering the boundary to the left of the current block and the boundary to the top of the current block (col. 5, lines 35-49), but does not explicitly disclose that the order of filtering boundaries is selected such that a boundary to the left of the current decoded image block is filtered before a boundary to the top of the current decoded image block. However, the Examiner notes that the specific filtering order is not

considered a patentable distinction, since it would have been chosen by the user during experimentation in order to meet his/her specific requirements. Therefore, it would have been obvious to modify Andrew's filtering process so that the boundary to the left of the current block is filtered before a boundary to the top of the current block is filtered; since no new or unexpected results are seen to be attained by that specific filtering order.

Referring to claim 51, Andrew further discloses that the modified pixel value is used when filtering is performed to reduce visual artefacts due to at least one other boundary between decoded image blocks (col. 4, line 5-col. 5, line 65).

Referring to claim 53, see the rejection of at least claim 49 above.

Referring to claim 55, Andrew further discloses that the digital image comprises at least one segment of image blocks and only boundaries between adjacent decoded image blocks that belong to the same segment are filtered (col. 3, lines 45-48 and col. 5, lines 68-49).

Referring to claim 58, see the rejection of at least claim 40 above. Andrew discloses an encoder (602) for encoding a digital image comprising a plurality of image blocks, the encoder comprising means for encoding image blocks to form encoded image blocks (col. 3, lines 1-36 and figure 6) and means for subsequently decoding the encoded image blocks to form decoded image blocks, each decoded image block comprising a number of reconstructed pixels, each reconstructed pixel having an associated pixel value (col. 3, line 37-col. 4, line 3), the encoder comprising a filter for reducing visual artifacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded block, the filter being arranged to modify the pixel value of at least one reconstructed pixel in at least one of the current decoded image block and the previously decoded image block by filtering to

produce a modified pixel value (col. 4, line 5-col. 5, line 35 and col. 5, line 66-col. 6, line 14), wherein the encoder is arranged to make the modified pixel value available for use in further processing of an image block within the same image (col. 4, line 5-col. 5, line 65).

Andrew does not explicitly disclose that the further processing comprises INTRA prediction of an image block within the same image as the current decoded image block and the previously decoded image block. However, this feature was exceedingly well known in the art. For example, Nishi discloses INTRA prediction of an image block that is performed after a current block within the same image is decoded [col. 24, line 50-col. 25, line 6, and figure 2. Note that the "current block" is decoded in (203) and the intra prediction is performed subsequently in (210)]. Note that the combination of Andrew and Nishi would result in the pixel values being corrected by the filtering method of Andrew, and the corrected pixel values subsequently being used in the intra prediction method of Nishi.

Andrew and Nishi are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Andrew in view of Nishi. The suggestion/motivation for doing so would have been to reduce spatially redundant information in the image, thereby improving the coding efficiency (Nishi, col. 3, line 66-col. 4, line 2). Therefore, it would have been obvious to combine Andrew with Nishi to obtain the invention as specified in claim 58.

Referring to claim 61, see the rejection of at least claim 45 above.

Referring to claim 62, Andrew further discloses that the filter is arranged to reduce visual artifacts due to more than one boundary between the current decoded image block and previously decoded image block adjacent to the current decoded image block (col. 5, lines 3-64).

Referring to claim 63, see the rejection of at least claim 47 above.

Referring to claim 64, see the rejection of at least claim 40 above.

Referring to claim 66, see the rejection of at least claim 53 above.

Referring to claim 76, see the rejection of at least claim 40 above. Andrew discloses a decoder (602) for decoding an encoded digital image, the encoded digital image comprising a plurality of encoded image blocks and having been formed by encoding a digital image comprising a plurality of image blocks, the decoder comprising means for decoding the encoded image blocks to form decoded image blocks, each decoded image block comprising a number of reconstructed pixels, each reconstructed pixel having an associated pixel value (col. 3, line 8-col. 4, line 3 and col. 5, line 65-col. 6, line 14), the decoder comprising a filter for reducing visual artifacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded block, the filter being arranged to modify the pixel value of at least one of the current decoded image block and the previously decoded image block by filtering to produce a modified pixel value (col. 4, line 5-col. 5, line 35), wherein the decoder is arranged to make the modified pixel value available for use in further processing of an image block within the same image (col. 4, line 5-col. 5, line 65).

Andrew does not explicitly disclose that the further processing comprises INTRA prediction of an image block within the same image as the current decoded image block and the previously decoded image block. However, this feature was exceedingly well known in the art.

For example, Nishi discloses INTRA prediction of an image block that is performed after a current block within the same image is decoded [col. 24, line 50-col. 25, line 6, and figure 2. Note that the "current block" is decoded in (203) and the intra prediction is performed subsequently in (210)]. Note that the combination of Andrew and Nishi would result in the pixel values being corrected by the filtering method of Andrew, and the corrected pixel values subsequently being used in the intra prediction method of Nishi.

Andrew and Nishi are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Andrew in view of Nishi. The suggestion/motivation for doing so would have been to reduce spatially redundant information in the image, thereby improving the coding efficiency (Nishi, col. 3, line 66-col. 4, line 2). Therefore, it would have been obvious to combine Andrew with Nishi to obtain the invention as specified in claim 76.

Referring to claim 79, Andrew further discloses that the filter is arranged to modify the value of at least one reconstructed pixel in at least one of the current decoded image block and the previously decoded image block immediately after the current decoded image block is formed and a boundary exists between the current decoded image block and the previously decoded image block (col. 5, lines 3-63 and figure 3).

Referring to claim 80, see the rejection of at least claim 62 above.

Referring to claim 81, see the rejection of at least claim 63 above.

Referring to claim 82, see the rejection of at least claim 64 above.

Referring to claim 91, see the rejection of at least claim 55 above.

Referring to claim 94, see the rejection of at least claim 58 above. Andrew further discloses a terminal (figure 6) comprising the encoder described above.

Referring to claims 95-96, Andrew and Nishi do not explicitly disclose that the terminal is a wireless terminal of a mobile communications system. However, Official notice is taken that a wireless terminal of a mobile communications system was exceedingly well known in the art. Therefore, it would have been obvious to modify the terminal of Andrew and Nishi so that it is a wireless terminal of a mobile communications system. The suggestion/motivation for doing so would have been to enhance the mobility/flexibility of the system.

Referring to claim 111, see the rejection of at least claim 76 above. Andrew further discloses a terminal (figure 6) comprising the decoder described above.

Referring to claims 112-113, see the rejection of at least claims 95-96 above.

6. Claims 41-44, 50, 59, 60, 77, 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Andrew, U.S. Patent No. 6,563,958 ("Andrew"), Nishi, U.S. Patent No. 6,275,533 ("Nishi"), and Osa, U.S. Patent No. 6,496,605 ("Osa").

Referring to claim 41, Andrew and Nishi do not explicitly disclose that the encoding of an image block to form an encoded image block is performed using motion compensated prediction with respect to a reference image using the modified pixel value. However, this feature was exceedingly well known in the art. For example, Osa discloses the step of encoding an image block to form an encoded image block by using motion compensated prediction of at least one pixel value with respect to a reference image using a modified (block boundary filtered) pixel value (col. 4, lines 20-64, col. 9, lines 6-35, and figure 8).

Andrew, Nishi, and Osa are combinable because they are all concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the encoding process of Andrew and Nishi so that it is performed using motion compensated prediction, as taught by Osa. The suggestion/motivation for doing so would have been to provide a block boundary filtering performance that is much more powerful than typical filtering systems (Osa, col. 9, lines 30-35). Therefore, it would have been obvious to combine Andrew and Nishi with Osa to obtain the invention as specified in claim 41.

Referring to claim 42, Osa further discloses that the decoding of an encoded image block to form a decoded image block is performed using motion compensated prediction with respect to a reference image using the modified pixel value (col. 4, lines 20-64, col. 9, lines 6-35, and figure 9).

Referring to claim 43, Andrew and Nishi do not explicitly disclose that the encoding of an image block to form an encoded image block is performed using intra prediction with reference to a previously encoded and subsequently decoded image block of the digital image using the modified pixel value. However, this feature was exceedingly well known in the art. For example, Osa discloses the step of encoding an image block to form an encoded image block by using intra prediction with reference to a previously encoded and subsequently decoded image block of a digital image using a modified (block boundary filtered) pixel value (col. 4, lines 20-64, col. 9, lines 6-35, and figure 8).

Andrew, Nishi, and Osa are combinable because they are all concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would

have been obvious to a person of ordinary skill in the art to modify the encoding process of Andrew and Nishi in view of Osa. The suggestion/motivation for doing so would have been to provide a block boundary filtering performance that is much more powerful than typical filtering systems (Osa, col. 9, lines 30-35). Therefore, it would have been obvious to combine Andrew and Nishi with Osa to obtain the invention as specified in claim 43.

Referring to claim 44, Osa further discloses that the decoding of an encoded image block to form a decoded image block is performed using intra prediction with reference to a previously encoded and subsequently decoded image block of the digital image using the modified pixel value (col. 4, lines 20-64, col. 9, lines 6-35, and figure 9).

Referring to claim 50, Andrew and Nishi do not explicitly disclose that the filtering to reduce visual artifacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded image block is performed during encoding of the image blocks in an image encoder to form encoded image blocks and further during decoding of the encoded image blocks in a corresponding image decoder. However, this feature was exceedingly well known in the art. For example, Osa discloses a filtering process to reduce visual artifacts due to a boundary between a two adjacent decoded image blocks during encoding of the image blocks in an image encoder to form encoded image blocks and further during decoding of the encoded image blocks in a corresponding image decoder (figures 8-9).

Andrew, Nishi, and Osa are combinable because they are both concerned with filtering the block boundaries in a digital image. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the filtering process of Andrew and Nishi in

view of Osa. The suggestion/motivation for doing so would have been to provide a block boundary filtering performance that is much more powerful than typical filtering systems (Osa, col. 9, lines 30-35). Therefore, it would have been obvious to combine Andrew and Nishi with Osa to obtain the invention as specified in claim 50.

Andrew, Nishi, and Osa do not explicitly disclose that the order of filtering boundaries used during decoding is the same as that during encoding. However, the Examiner notes that this feature would have been obvious in Andrew and Osa. The suggestion/motivation for doing so would have been to provide a complementary decoder that is capable of properly decoding the encoded image blocks (Andrew, col. 3, lines 54-56).

Referring to claim 59, see the rejection of at least claim 41 above.

Referring to claim 60, see the rejection of at least claim 43 above.

Referring to claim 77, see the rejection of at least claim 41 above.

Referring to claim 78, see the rejection of at least claim 43 above.

7. Claims 52, 54, 65, 67-73, 83-90, 97-99, 102, 105, 108-110, 114-116 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Andrew, U.S. Patent No. 6,563,958 ("Andrew"), Nishi, U.S. Patent No. 6,275,533 ("Nishi"), and Keith et al., U.S. Patent No. 5,493,513 ("Keith").

Referring to claim 52, see the discussion of claim 40 above. Andrew discloses a method for reducing visual artifacts in a digital image comprising a plurality of image blocks in which image blocks are encoded to form encoded image blocks and the encoded image blocks are subsequently decoded to form decoded image blocks, each decoded image block comprising a

number of reconstructed pixels (col. 3, line 37-col. 4, line 4), each reconstructed pixel having an associated pixel value and filtering is performed to reduce visual artifacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded image block such that the pixel value of at least one reconstructed pixel in at least one of the current decoded image block and the previously decoded image block is modified by filtering to produce a modified pixel value (col. 4, line 5-col. 5, line 35), wherein the digital image is filtered block by block according to a certain scanning order, and that the modified pixel value is made available for use in further processing of an image block within the same image (col. 4, line 5-col. 5, line 65).

Andrew does not explicitly disclose that the further processing comprises INTRA prediction of an image block within the same image as the current decoded image block and the previously decoded image block. However, this feature was exceedingly well known in the art. For example, Nishi discloses INTRA prediction of an image block that is performed after a current block within the same image is decoded [col. 24, line 50-col. 25, line 6, and figure 2. Note that the "current block" is decoded in (203) and the intra prediction is performed subsequently in (210)]. Note that the combination of Andrew and Nishi would result in the pixel values being corrected by the filtering method of Andrew, and the corrected pixel values subsequently being used in the intra prediction method of Nishi.

Andrew and Nishi are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Andrew in view of Nishi. The suggestion/motivation for doing so would have been to reduce spatially redundant

information in the image, thereby improving the coding efficiency (Nishi, col. 3, line 66-col. 4, line 2). Therefore, it would have been obvious to combine Andrew with Nishi.

Andrew and Nishi do not explicitly disclose that the image blocks are grouped into macroblocks. However, this feature was exceedingly well known in the art. For example, Keith discloses image blocks that are grouped into macroblocks, wherein the digital image is processed macroblock by macroblock according to a certain scanning order (col. 6, lines 15-28 and figure 5).

Andrew, Nishi, and Keith are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image blocks of Andrew and Nishi so that they are grouped into macroblocks, as taught by Keith. The suggestion/motivation for doing so would have been to enhance the processing speed of the encoding and decoding process (Keith, col. 1, lines 10-56). Therefore, it would have been obvious to combine Andrew and Nishi with Keith to obtain the invention as specified in claim 52.

Referring to claim 54, Andrew further discloses that the filtering to reduce visual artifacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded image block is performed for all boundaries within an image block before filtering to reduce visual artifacts is performed within the next image block in the scanning order (col. 5, lines 12-65 and figure 3). However, Andrew does not explicitly disclose that the filtering is performed on all boundaries within a macroblock before filtering the next macroblock in the scanning order.

Keith discloses the step of processing all the image blocks of a given macroblock in a macroblock scanning order before processing image blocks of the next macroblock in the macroblock scanning order (col. 6, lines 15-28 and figure 5). Accordingly, the combination of Andrew, Nishi, and Keith disclose that the filtering is performed on all boundaries within a macroblock before filtering the next macroblock in the scanning order.

Referring to claim 65, see the discussion of at least claim 40 above. Andrew discloses an encoder (602) for encoding a digital image comprising a plurality of image blocks which are grouped into image blocks, the encoder comprising means for encoding image blocks to form encoded image blocks (col. 3, lines 1-36 and figure 6), and means for subsequently decoding the encoded image blocks to form decoded image blocks, each decoded image block comprising a number of reconstructed pixels, each reconstructed pixel having an associated pixel value (col. 3, line 37-col. 4, line 3), the encoder comprising a filter for reducing visual artifacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded image block, the filter being arranged to modify the pixel value of at least one reconstructed pixel in at least one of the current decoded image block and the previously decoded image block by filtering to produce a modified pixel value (col. 4, line 5-col. 5, line 64 and col. 5, line 66-col. 6, line 14), wherein the filter is arranged to filter the image block by block according to a certain image block scanning order (col. 3, line 1-col. 4, line 3 and figures 1-3), and that the encoder is arranged to make the modified pixel value available for use in further processing of an image block within the same image (col. 4, line 5-col. 5, line 65).

Andrew does not explicitly disclose that the further processing comprises INTRA prediction of an image block within the same image as the current decoded image block and the

previously decoded image block. However, this feature was exceedingly well known in the art. For example, Nishi discloses INTRA prediction of an image block that is performed after a current block within the same image is decoded [col. 24, line 50-col. 25, line 6, and figure 2. Note that the "current block" is decoded in (203) and the intra prediction is performed subsequently in (210)]. Note that the combination of Andrew and Nishi would result in the pixel values being corrected by the filtering method of Andrew, and the corrected pixel values subsequently being used in the intra prediction method of Nishi.

Andrew and Nishi are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Andrew in view of Nishi. The suggestion/motivation for doing so would have been to reduce spatially redundant information in the image, thereby improving the coding efficiency (Nishi, col. 3, line 66-col. 4, line 2). Therefore, it would have been obvious to combine Andrew with Nishi.

Andrew and Nishi do not explicitly disclose that the plurality of image blocks are grouped into macroblocks. However, this feature was exceedingly well known in the art. For example, Keith discloses image blocks that are grouped into macroblocks, wherein the digital image is processed macroblock by macroblock according to a certain scanning order (col. 6, lines 15-28 and figure 5).

Andrew, Nishi, and Keith are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image blocks of Andrew and Nishi so that they are grouped into macroblocks, as taught by Keith. The

suggestion/motivation for doing so would have been to enhance the processing speed of the encoding and decoding process (Keith, col. 1, lines 10-56). Therefore, it would have been obvious to combine Andrew and Nishi with Keith to obtain the invention as specified in claim 65.

Referring to claim 67, see the rejection of at least claim 54 above.

Referring to claim 68, Andrew further discloses that the encoder is arranged to encode and subsequently decode the image blocks in a certain block scanning order (col. 3, lines 1-67 and col. 5, lines 35-65). As noted above (claim 65), Keith discloses image blocks that are grouped into macroblocks, wherein the image blocks of a macroblock are encoded and subsequently decoded according to a certain block scanning order (col. 6, lines 15-28 and figure 5). Accordingly, the combination of Andrew, Nishi, and Keith disclose the step of encoding and subsequently decoding the image blocks of a macroblock in a certain block scanning order.

Referring to claim 69, Andrew further discloses the step of encoding and subsequently decoding the image blocks of a macroblock, as noted above (claim 65), but does not disclose that the processing (encoding and subsequently decoding) is performed on all the image blocks of a given macroblock in a macroblock scanning order before processing (encoding and subsequently decoding) image blocks of the next macroblock in the macroblock scanning order.

Keith discloses the step of processing (encoding and decoding) all the image blocks of a given macroblock in a macroblock scanning order before processing (encoding and decoding) image blocks of the next macroblock in the macroblock scanning order (col. 6, lines 15-28 and figure 5). Note that the combination of Andrew, Nishi, and Keith disclose that the processing (encoding and subsequently decoding) is performed on all the image blocks of a given

macroblock in a macroblock scanning order before processing (encoding and subsequently decoding) image blocks of the next macroblock in the macroblock scanning order.

Referring to claim 70, Andrew further discloses that the filter is arranged to reduce visual artifacts due to boundaries between decoded image blocks by filtering, according to the block scanning order substantially immediately after each encoded image block is decoded to form a current decoded image block and a boundary exists between the current decoded image block and a previously decoded image block adjacent to the current decoded image block (col. 4, line 4-col. 5, line 64). As noted above (claim 65), Keith discloses image blocks that are grouped into macroblocks. Accordingly, the combination of Andrew, Nishi, and Keith disclose the step of reducing visual artifacts due to boundaries between decoded image blocks of a macroblock by filtering.

Referring to claim 71, see the discussion of at least claim 62 above.

Referring to claim 72, see the discussion of at least claim 63 above.

Referring to claim 73, see the discussion of at least claim 55 above.

Referring to claim 83, Andrew discloses a decoder (692) for decoding an encoded digital image, the encoded digital image comprising a plurality of encoded image blocks and having been formed by encoding a digital image comprising a plurality of image blocks, the decoder comprising means for decoding the encoded the image blocks to form decoded image blocks, each decoded image block comprising a number of reconstructed pixels, each reconstructed pixel having an associated pixel value (col. 3, line 9-col. 4, line 3), the decoder comprising a filter for reducing visual artifacts due to a boundary between a current decoded image block and a previously decoded image block adjacent to the current decoded image block, the filter being

arranged to modify the pixel value of at least one reconstructed pixel in at least one of the current decoded image block and the previously decoded image block by filtering to produce a modified pixel value, wherein the filter is arranged to filter the image block by block according to a certain block scanning order (col. 4, line 4-col. 5, line 64 and figure 3), and that the decoder is arranged to make the modified pixel value available for use in further processing of an image block within the same image (col. 4, line 5-col. 5, line 65).

Andrew does not explicitly disclose that the further processing comprises INTRA prediction of an image block within the same image as the current decoded image block and the previously decoded image block. However, this feature was exceedingly well known in the art. For example, Nishi discloses INTRA prediction of an image block that is performed after a current block within the same image is decoded [col. 24, line 50-col. 25, line 6, and figure 2. Note that the "current block" is decoded in (203) and the intra prediction is performed subsequently in (210)]. Note that the combination of Andrew and Nishi would result in the pixel values being corrected by the filtering method of Andrew, and the corrected pixel values subsequently being used in the intra prediction method of Nishi.

Andrew and Nishi are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the method of Andrew in view of Nishi. The suggestion/motivation for doing so would have been to reduce spatially redundant information in the image, thereby improving the coding efficiency (Nishi, col. 3, line 66-col. 4, line 2). Therefore, it would have been obvious to combine Andrew with Nishi.

Andrew and Nishi do not explicitly disclose that the plurality of image blocks are grouped into macroblocks. However, this feature was exceedingly well known in the art. For example, Keith discloses image blocks that are grouped into macroblocks, wherein the digital image is processed macroblock by macroblock according to a certain scanning order (col. 6, lines 15-28 and figure 5).

Andrew, Nishi, and Keith are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image blocks of Andrew so that they are grouped into macroblocks, as taught by Keith. The suggestion/motivation for doing so would have been to enhance the processing speed of the encoding and decoding process (Keith, col. 1, lines 10-56). Therefore, it would have been obvious to combine Andrew and Nishi with Keith to obtain the invention as specified in claim 83.

Referring to claim 84, see the discussion of at least claim 53 above.

Referring to claim 85, see the rejection of at least claim 54 above.

Referring to claim 86, Andrew further discloses that the image blocks are encoded by an encoder to form encoded image blocks according to a certain block scanning order (col. 3, lines 8-36), characterized in that the decoder is further arranged to decode the encoded image blocks in a certain block scanning order (col. 3, lines 36-65). As noted above (claim 83), Keith discloses image blocks that are grouped into macroblocks, wherein the image blocks of a macroblock are encoded and decoded according to a certain block scanning order (col. 6, lines 15-28 and figure 5). Accordingly, the combination of Andrew, Nishi, and Keith disclose the step of encoding and decoding the image blocks of a macroblock in a certain block scanning order.

Referring to claim 87, see the rejection of at least claim 69 above.

Referring to claim 88, Andrew further discloses that the filter is arranged to reduce visual artifacts due to boundaries between decoded image blocks by filtering, according to the block scanning order substantially immediately after each encoded image block is decoded to form a current decoded image block and a boundary exists between the current decoded image block and a previously decoded image block adjacent to the current decoded image block (col. 4, line 4-col. 5, line 64).

Referring to claim 89, see the discussion of at least claim 62 above.

Referring to claim 90, see the discussion of at least claim 63 above.

Referring to claim 97, see the rejection of at least claim 65 above. Andrew further discloses a storage medium comprising a computer program for operating a computer as an encoder, and the program code for performing the steps above (col. 5, line 66-col. 6, line 14 and figure 6).

Referring to claim 98, see the rejection of at least claim 83 above. Andrew further discloses a storage medium comprising a computer program for operating a computer as a decoder, and the program code for performing the steps above (col. 5, line 66-col. 6, line 14 and figure 6).

Referring to claim 99, see the discussion of at least claim 55 above.

Referring to claim 102, see the discussion of at least claim 55 above.

Referring to claim 105, see the discussion of at least claim 55 above.

Referring to claim 108, see the rejection of at least claim 65 above. Andrew further discloses a terminal (figure 6) comprising the encoder described above.

Referring to claims 109-110, see the discussion of at least claims 95-96 above.

Referring to claim 114, see the rejection of at least claim 83 above. Andrew further discloses a terminal (figure 6) comprising the decoder described above.

Referring to claims 115-116, see the discussion of at least claims 95-96 above.

8. Claims 56, 74, 92 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Andrew, U.S. Patent No. 6,563,958 ("Andrew"), Nishi, U.S. Patent No. 6,275,533 ("Nishi"), and Fukuda et al., U.S. Patent No. 6,434,275 ("Fukuda").

Referring to claim 56, Andrew and Nishi do not explicitly disclose that the digital image comprises a luminance component and at least one chrominance component. However, this feature was exceedingly well known in the art. For example, Fukuda discloses a digital image that comprises a luminance component and at least one chrominance component, wherein filtering is performed to reduce visual artifacts due to a boundary between a current block and an adjacent block in the luminance component (col. 26, lines 34-65 and figure 25).

Andrew, Nishi, and Fukuda are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the digital image of Andrew and Nishi so that it comprises a luminance component and at least one chrominance component, wherein filtering is performed to reduce visual artifacts due to a boundary between a current block and an adjacent block in the luminance component, as taught by Fukuda. The suggestion/motivation for doing so would have been to provide a simple yet stable process for reducing block distortion in which omission of high-frequency components can be eliminated

(Fukuda, col. 2, lines 29-40). Therefore, it would have been obvious to combine Andrew and Nishi with Fukuda to obtain the invention as specified in claim 56.

Referring to claim 74, see the rejection of at least claim 56 above.

Referring to claim 92, see the rejection of at least claim 56 above.

9. Claims 57, 75, 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Andrew, U.S. Patent No. 6,563,958 ("Andrew"), Nishi, U.S. Patent No. 6,275,533 ("Nishi"), and Zhou, U.S. Patent No. 6,236,764 ("Zhou").

Referring to claim 57, Andrew and Nishi do not explicitly disclose that the digital image comprises at least a first color component and a second color component. However, this feature was exceedingly well known in the art. For example, Zhou discloses an image that comprises at least a first color component (CB) and a second color component (CR), wherein filtering is performed to reduce visual artifacts due to a boundary between a current block and an adjacent block in the first color component (col. 8, lines 10-49 and step 110 in figure 5).

Andrew, Nishi, and Zhou are combinable because they are both concerned with coding an image by dividing the image into a plurality of blocks. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image of Andrew and Nishi so that it comprises at least a first color component and a second color component, wherein filtering is performed to reduce visual artifacts due to a boundary between a current block and an adjacent block in the first color component, as taught by Zhou. The suggestion/motivation for doing so would have been to enhance the boundary filtering process by providing a relatively simple yet accurate boundary filtering algorithm that is fast enough for real-time applications

(Zhou, col. 8, line 59-col. 9, line 5). Therefore, it would have been obvious to combine Andrew and Nishi with Zhou to obtain the invention as specified in claim 57.

Referring to claim 75, see the rejection of at least claim 57 above.

Referring to claim 93, see the rejection of at least claim 57 above.

10. Claims 100, 103, 106 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Andrew, U.S. Patent No. 6,563,958 ("Andrew"), Nishi, U.S. Patent No. 6,275,533 ("Nishi"), Keith et al., U.S. Patent No. 5,493,513 ("Keith"), and Fukuda et al., U.S. Patent No. 6,434,275 ("Fukuda").

Referring to claim 100, Andrew, Nishi, and Keith do not explicitly disclose that the digital image comprises a luminance component and at least one chrominance component. However, this feature was exceedingly well known in the art. For example, Fukuda discloses a digital image that comprises a luminance component and at least one chrominance component, wherein filtering is performed to reduce visual artifacts due to a boundary between a current block and an adjacent block in the luminance component (col. 26, lines 34-65 and figure 25).

Andrew, Nishi, Keith, and Fukuda are combinable because they are both concerned with filtering the block boundaries in a digital image. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the digital image of Andrew, Nishi, and Keith so that it comprises a luminance component and at least one chrominance component, wherein filtering is performed to reduce visual artifacts due to a boundary between a current block and an adjacent block in the luminance component, as taught by Fukuda. The suggestion/motivation for doing so would have been to provide a simple yet stable process for

reducing block distortion in which omission of high-frequency components can be eliminated (Fukuda, col. 2, lines 29-40). Therefore, it would have been obvious to combine Andrew, Nishi, and Keith with Fukuda to obtain the invention as specified in claim 100.

Referring to claim 103, see the rejection of at least claim 100 above.

Referring to claim 106, see the rejection of at least claim 100 above.

11. Claims 101, 104, 107 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Andrew, U.S. Patent No. 6,563,958 ("Andrew"), Nishi, U.S. Patent No. 6,275,533 ("Nishi"), Keith et al., U.S. Patent No. 5,493,513 ("Keith"), and Zhou, U.S. Patent No. 6,236,764 ("Zhou").

Referring to claim 101, Andrew, Nishi, and Keith do not explicitly disclose that the digital image comprises at least a first color component and a second color component. However, this feature was exceedingly well known in the art. For example, Zhou discloses an image that comprises at least a first color component (CB) and a second color component (CR), wherein filtering is performed to reduce visual artifacts due to a boundary between a current block and an adjacent block in the first color component (col. 8, lines 10-49 and step 110 in figure 5).

Andrew, Nishi, Keith, and Zhou are combinable because they are both concerned with filtering the block boundaries in a digital image. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to modify the image of Andrew, Nishi, and Keith so that it comprises at least a first color component and a second color component, wherein filtering is performed to reduce visual artifacts due to a boundary between a current block and an

adjacent block in the first color component, as taught by Zhou. The suggestion/motivation for doing so would have been to enhance the boundary filtering process by providing a relatively simple yet accurate boundary filtering algorithm that is fast enough for real-time applications (Zhou, col. 8, line 59-col. 9, line 5). Therefore, it would have been obvious to combine Andrew, Nishi, and Keith with Zhou to obtain the invention as specified in claim 101.

Referring to claim 104, see the rejection of at least claim 101 above.

Referring to claim 107, see the rejection of at least claim 101 above.

Conclusion

12. Because this Office Action is considered a "subsequent action on the merits" under MPEP 706.07(a), **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Charles Kim whose telephone number is 571-272-7421. The

examiner can normally be reached on Mon thru Thurs 8:30am to 6pm and alternating Fri 9:30am to 6pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on 571-272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-272-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ck
January 16, 2007

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